FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 74 Thursday, November 2, 1944 No. 1472

A Good Beginning

There are several important lessons to be learnt from the rather unorthodox scheme created by Mr. J. W. Gardom, the President of the Institute of British Foundrymen, for ensuring the interest of youth in the art and science of making castings. This scheme, it will be remembered, is based on the enlightenment of a few youths engaged in foundry practice by permitting them personally to follow the deliberations of a technical committee from its inception to the production of a final report. As these meetings are held in various large cities throughout the country, a certain amount of travelling is involved, and the " studentships " established by the President take the form of the payment of full expenses involved in such journeys. These are no negligible items, as every company secretary knows, and the sum made available is thought to be sufficient to cover five studentships. When the youth of the industry was asked to respond, it did so in such full measure that no fewer than 76 applications were received! Such a response places into relief a number of important factors, outstanding amongst which is drawing power of a novel approach to any subject.

This type of outlook is exactly what is necessary towards " winning the peace "—it has been aptly designated by an American labour leader as " the re-tooling of the brain-box." Manufacturers are cognisant and appreciative of what their sales managers do for them by way of producing " stoppers " in advertising matter, but they on their side must show the same originality of thought. Next, the fact of quantity shows that 76 youths are really enthusiastic as to the potential interest of the chosen vocation. Such a number is more likely to represent a cross-section rather than the *élite*. The success attending the launching of the scheme is due to the fact that the President, by recapturing the spirit of youth, made possible the immediate attainment of just one of its unexpressed ambitions. All the juniors in all works envy their seniors, when business takes them to other towns. They long for the time when they, too, will see more of the world, and meet those people who they esteem as leaders in the world of technology.

Another important aspect is the breaking down of any inherent inferiority complex by familiarity with the insides of the big business hotels. One foundryman who rose to prominence once confessed to us that he never quite overcame his fear of waiters! A good foundryman must be a good mixer with his fellow-men and participation in committee activities is, through its informal atmosphere, an excellent apprenticeship. From its very nature, the President's scheme is difficult of expansion, but its real worth demands that it should at least be continuous. Every technical committee should have its student member, and employers who find the scheme more than useful in the conversion of their youths into enthusiastic staff men should, and indeed must, support any fund created to replace the one now being exhausted.

The American Smelting & Refining Company has been able to increase the copper-lead ratio of both speiss and matte in handling copper in lead plants by a soda-ash treatment in smelting the lead drosses. This eliminates the formation of all slags and is well suited for lead plants, where little speiss is formed and the copper content of the charge is high. The increase in the grade of copper concentrates has made direct-smelting more attractive. At Hudson Bay's Flin Flon plant the tonnage of pay charge treated and the amount of copper produced will be higher. Besides handling all available tonnage of concentrates through the roasters and reverberatory furnace, selected high-grade ore from the mine will be smelted direct in the converters. A tunnel has been blasted out alongside the furnace and a track installed, so that a ladle can be run close to the tapholes for tapping the matte.

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BOOK REVIEW

International Currency Experience. Published by the League of Nations, and obtainable from Allen & Unwin, Limited, 40, Museum Street, London, W.C.1. Price: Paper bound 12s. 6d., or cloth bound 15s.

This book is a survey of international monetary relations between the two wars, designed particularly to bring out conclusions of value for the task of reconstruction after the present war. The period covered—one of the most eventful in monetary history—furnishes a wealth of evidence concerning almost every conceivable type of international currency mechanism. This study examines, accordingly, the operation and breakdown of the gold and gold exchange standard; devaluations and fluctuating exchanges; the emergence of currency groups such as the sterling area and the gold bloc; the trend of central banking policies in relation to gold movements; the rise of exchange stabilisation funds; exchange control and bilateral clearing arrangements, etc. Special attention is paid to the capital needs of the world's backward areas; the problems of primary producing countries; the disturbances caused by "hot money" transfers; the impact of booms and depressions on the balance of international payments. The conclusions of the survey point the way to a system in which stable exchanges and increased trade are promoted through international co-ordination of domestic policies for the maintenance of employment and economic stability.

Here are some of the general questions discussed in this book: Why did the automatic gold-standard mechanism break down? What are the basic conditions required for a system of stable exchanges in the future? If gold is used as a means of international settlement, what methods are there for regulating the supply of it in relation to demand? What are the prerequisites for the successful functioning of an exchange-reserve system such as the gold exchange standard or the sterling area? How can individual countries make use of gold or exchange reserves as a "buffer" against deflationary or inflationary effects of fluctuations in their balance of payments? What are the basic factors governing the need, the desire and the ability of various types of countries to hold reserves for this purpose? How are the "correct" exchange rates to be determined between the different currencies? In what circumstances may adjustments of exchange rates be necessary or appropriate? What can be done about speculative capital movements of the "hot money" type?

It is mainly in the light of practical experience that these and other questions are considered; and thus the book provides a review of the whole course of international monetary developments during the inter-war period. Quite apart from the lessons it draws for the future therefore, this review of two critical decades of monetary history should alone be of interest to a wide public. The work is the only one of its kind that has yet appeared.

FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION

MR. CHERRY PATERSON ELECTED PRESIDENT

At the annual general meeting of the Association held last Wednesday at the Waldorf Hotel, London, W.C.2, Mr. Cherry Paterson, M.I.Mech.E., was elected president for the ensuing year. Mr. E. J. Paterson was re-elected vice-president. After the conclusion of the formal business, the members devoted themselves to the consideration of a Report from a sub-committee consisting of Mr. Paterson, Mr. H. Winterton, and Mr. D. H. Wood. The retiring president, Mr. G. E. France, detailed the recommendations, amongst which were the institution of a common secretariat for the Association and the Export Group, increased activities for the Association, and the appointment—because of this—of a new secretary. Mr. K. W. Bridges, who has been secretary since its inception, expressed his desire to retire owing to pressure of business; he promised to continue until a fresh appointment was made.

Negotiations are now being energetically pursued for establishing the Association on a much broader basis. Mr. W. Rawlinson (J. W. Jackman & Company, Limited), Mr. H. Turner (Coleman Foundry Equipment Company, Limited), and Mr. T. A. Hammersley (Marco Conveyor & Engineering Company), were added to the council. The retiring president, Mr. G. E. France, who has occupied the chair for five years, was very cordially thanked for his untiring efforts to extend the work of the Association, which now have every prospect of being achieved.

CATALOGUES RECEIVED

Roller Bearings. British Timken, Limited, of Cheston Road, Aston, Birmingham, 7, have sent us a 24-page, well-illustrated brochure, detailing the application of tapered roller bearings to rolling mill practice.

Fused Tee Boxes. An important item in industrial wiring is the teeing off from a paper insulated lead covered feeder cable to branch circuits. For this purpose British Insulated Cables, Limited, of Prescot, Lancs, have designed and marketed a fused tee box. It is described and illustrated in an 8-page brochure which they have sent us.

Ladle Nozzles. From Samuel Fox & Company, Stocksbridge Works, near Sheffield, comes a most interesting brochure dealing with a new and well tried invention relating to the improvement in the control of turning speeds. This important phase of metallurgical control is effected by the instantaneous removal—through the use of a bayonet joint—of one of two or more detachable nozzles of increasing internal diameter so as thereby to maintain constant turning speed with a diminishing head of metal in the ladle. The system, which is patented, and known as the Bagnall-Bethel nozzle, is now being made available for all steelworks and foundries by licence.

MODIFICATION BY HEAT-TREATMENT OF CAST STRUCTURES AND PROPERTIES

Castings can be heat-treated to give reliable mechanical properties

By H. T. ANGUS, Ph.D., M.Sc.

(*Continued from page* 135.)

Hyper Eutectoid Steel. High Carbon-Silicon Steel

Typical Analysis: 1.05 C, 1.0 Si and 0.4 Mn and less than 0.06 S and P.

On cooling to the upper critical point eutectoid pearlite is formed and hyper-eutectoid cementite is rejected—in general to the junctions of the original dendrite systems. Subsequent slow cooling leaves the cementite boundaries and pearlite substantially unchanged—a characteristic microstructure being shown in Fig. 12. Within this major structure, however, still exists the entirely separate structure dependent upon the chemical heterogeneity caused by progressive dendritic solidification from the molten state, and this may really be regarded as the primary structure of the metal which, so long as it exists substantially unchanged, will profoundly influence subsequent heat-treatment.

Figs. 10 and 11 illustrate in the same area these co-existent structures. Fig. 10 shows the area etched with modified Oberhoffer's reagent and Fig. 11 the same area repolished and etched with 4 per cent. Picral. From a comparison of these two apparently different structures in the same area it will be seen that the cementite boundaries do in fact roughly correspond with the interdendritic areas.

Normalising the casting well above the upper change point will greatly refine the structure, and with slow cooling (1 to 2 deg. C. per minute) will eliminate the boundaries of hypereutectoid cementite giving a coarse pearlite in which excess cementite is distributed at random (Fig. 13). Fairly rapid cooling in air blast (cooled 940 to 500 deg. C. in ten minutes) gives a much finer pearlite in which the hypereutectoid cementite is again concentrated in boundaries as in the cast state, but in a much refined form (Fig. 14). Provided normalising is carried out well above the upper change point and cooling to 800 deg. C. is not less than 1 to 2 deg. C. per min., there is no appreciable production

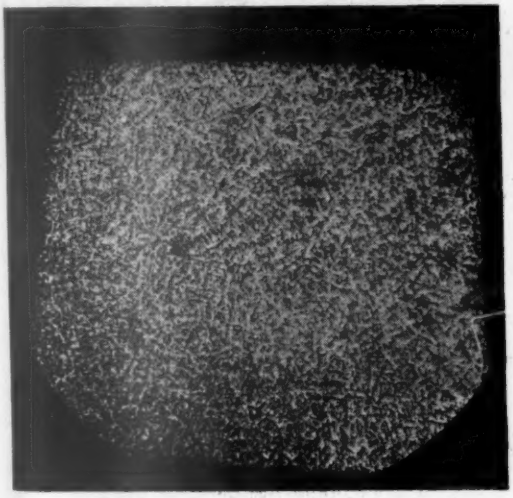

FIG. 10.—HYPEREUTECTOID STEEL AS CAST ETCHED WITH OBERHOFFER'S REAGENT. × 8.

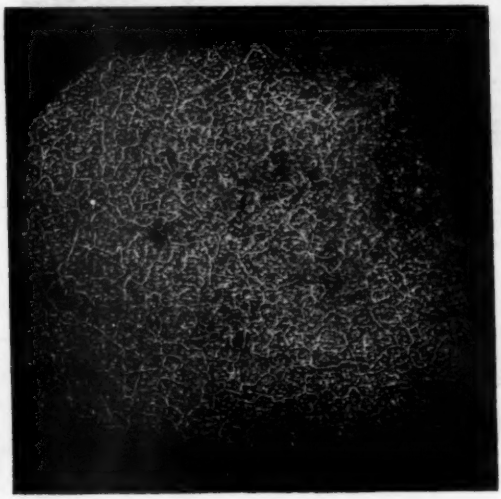

FIG. 11.—SAME AREA AS FIG. 10, ETCHED WITH PICRIC ACID IN ALCOHOL. × 8.

Modification by Heat-treatment

of temper carbon unless the silicon is above 1 per cent., when the tendency to produce temper carbon is greatly increased.

Normalising alone does not appreciably improve the mechanical properties, cooling in sand from above A_{cm} after 3 hrs. at 940 deg. C. lowers the Brinell to 280 to 300, lowers the ultimate tensile to 55 to 60 tons per sq. in., and slightly increases the elongation to about 5 per cent. Rapid cooling in air blast refines the structure, but leaves the hardness and other properties almost identical with the as cast state.

Maximum ductility is obtainable by a spheroidising anneal at 780 to 800 deg. C. for 3 to 4 hrs., followed by slow cooling not exceeding 40 deg. C. per hr. At this temperature—above A_1 the eutectoid and hypereutectoid cementite coalesces into spheroidal form and the resulting structure of ferrite, spheroidal cementite and uniformly distributed temper carbon is associated with fairly high tensile, good ductility and high wear resistance. Typical figures are shown in Table V, and a typical microstructure in Fig. 15.

It is at this stage that the original solidification structure may once more become evident. In the as cast and normalised state the dendritic solidification structure is discernable only with difficulty owing to the masking effect of major carbide redistribution. In the case of Fig. 15 where good properties and uniform spheroidisation have been produced, there is also practically no evidence of dendritic segregation—an exceedingly faint dendritic macrostructure may be just discernible to the naked eye on the polished and etched

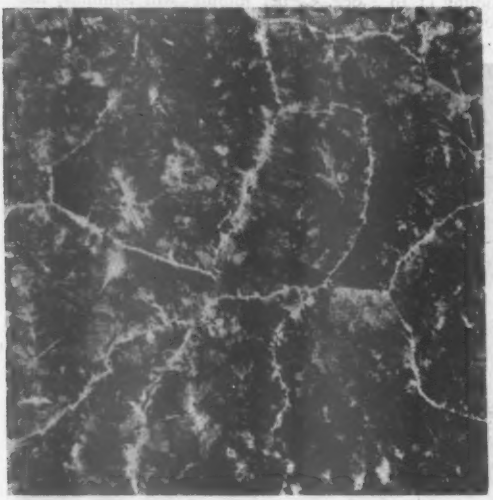

FIG. 12.—HYPEREUTECTOID STEEL AS CAST. × 65.

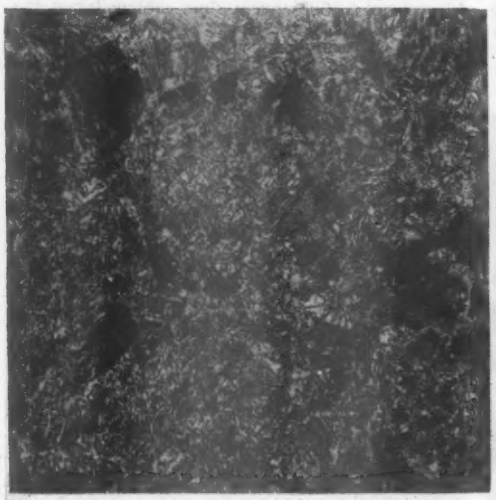

FIG. 13.—HYPEREUTECTOID STEEL HEATED AT 940 DEG. C. FOR 3 HOURS AND SLOWLY COOLED. × 300.

TABLE III.—*Further Results from Heat-treatment.*

Spec. no.	Heat-treatment. 1.	2. Temp., deg. C.	2. Time, mins.	3. Temp., deg. C.	3. Time, hrs.	Yield, tons per sq. in.²	Ultimate tons per sq. in.²	Elongation, per cent.	R. of A., per cent.	Brinell.	Izod, ft.-lbs.
4053/7	As cast	820	110 WQ	640	2¼	—	49.3	22.5	28.5	207	25:23:25
4053/10	,,	820	110 WQ	640	2¼	31.0	46.4	21.3	31.6	203	25:24:24
4053/9	,,	880	110 WQ	640	2¼	32.4	47.2	21.3	32.1	207	25:20:23
4053/12	,,	880	110 WQ	640	2¼	31.0	46.4	14.75	21.3	201	20:20:24

specimen, caused by very slight variations in density of distribution of cementite spheroids, which follow the original dendritic structure. Where variation in heat-treatment has caused imperfect spheroidisation the dendritic structure becomes much more clearly defined, particularly when it has been emphasised by minute casting inclusions.

Fig. 16 shows the dendritic structure clearly defined after a normalising treatment followed by imperfect spheroidising treatment. The dark area under oblique illumination has been magnified up and is shown under vertical illumination as a light area in Fig. 17, where it becomes clear that the difference between the light and dark areas is caused by the different pearlite arrangement, the carbide concentration in the light areas being lower and spheroidisation far less advanced than in the dark areas. Temper carbon is clearly shown at the boundaries of the light and dark areas, and is associated with lamellar rather than spheroidal cementite.

There is some indication in Fig. 17 that the light central area with fine lamellar pearlite has been fully austenitic during the partial spheroidisation of the surrounding areas, as the fan-shaped area of radial

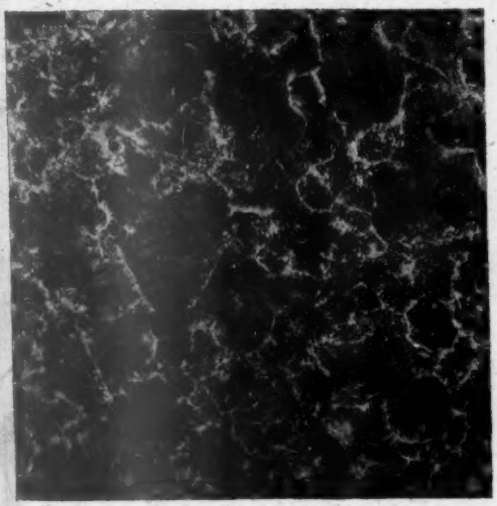

FIG. 14.—HYPEREUTECTOID STEEL HEATED AT 940 DEG. C. FOR 3 HOURS AND RAPIDLY COOLED. × 300.

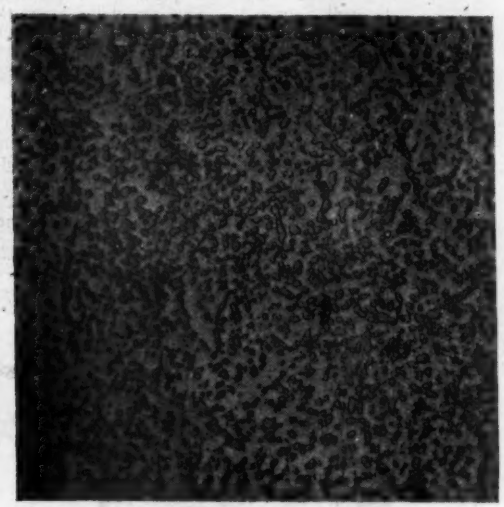

FIG. 15.—HYPEREUTECTOID STEEL FULLY SPHEROIDISED. × 600.

TABLE IV.—*Further Results from Heat-treatment.*

Spec. no.	Heat-treatment. 1. Temp. deg.C.	1. Time, mins.	1. Cool.	2. Temp., deg. C.	2. Time, mins.	2. Quench.	3. Temp., deg. C.	3. Time, hrs.	Yield, tons per sq. in.	Ultimate tons per sq. in.²	Elongation, per cent.	R. of A., per cent.	Brinell.	Izod, ft.-lbs.
4055/6	880	15	Air	820	80	Water	640	2½	35.2	50.4	21.5	30.8	217	22:19:19
4055/8	880	15	,,	880	80	,,	640	2½	33.4	50.0	18.5	30.2	223	22:21:22
4055/9	880	120	,,	820	80	,,	640	2½	35.6	50.2	19	29.6	229	25:23:22
4055/11	880	120	,,	880	80	,,	640	2½	33.3	49.5	20	31.6	229	20:17:20
4055/12	950	15	,,	820	80	,,	640	2½	34.4	49.8	19	32.2	217	26:—:24
4055/14	950	15	,,	880	80	,,	640	2½	36.0	50.1	18.5	29.7	229	21:22:24
4055/15	950	120	,,	820	80	,,	640	2½	36.0	52.0	18.5	30.9	234	18:18:23
4055/17	950	120	,,	880	80	,,	640	2½	33.7	49.4	18.5	33.8	219	22:23:23

Modification by Heat-treatment

pearlite seems characteristic of the austenite to pearlite transformation.[3]

Formation of Temper Carbon

Cementite is stated to be metastable at all temperatures below 1,200 deg. C. Where the concentration of carbon in austenite is low it will separate out as cementite, even where graphite was previously present, but where it is high it will separate out as graphite if graphitic nuclei are present. A previous 4-5-hr. soak well above A_{cm} by removing graphitic nuclei will again cause cementite to be precipitated even with high carbon austenite, but a subsequent very slow cool may cause breakdown of the cementite so formed, even with silicon free steel.

The upper change point is raised by about 9 deg. C.[3] for each 0.1 per cent. Si increase above 1 per cent., and this implies a reduction in solubility of cementite or graphite at a given temperature, with a corresponding tendency to retain massive cementite, which is itself unstable. It is uncertain how far the tendency to retain temper carbon above A_1, is a function of the actual graphitising power of the silicon, and how far it is due to the presence of silicon in iron retarding the direct solution of graphite as soon as it formed by breakdown of the cementite, but direct solution of graphite in austenite is said to be rapid at 25 deg. above A_1 with silicon steels, so that direct graphitisation by silicon is indicated.[4]

The presence therefore of massive cementite is a predisposing condition in the formation of temper carbon, and where, owing to high carbon content or insufficient time, or temperature, the hypereutectoid cementite is not completely broken down, it may form a nucleus for the formation and retention of temper carbon, as shown in Fig. 18.

In the cast state steel containing 1 per cent. C.: 1 per cent. Si breaks down to form temper carbon most freely at temperatures from 800 to 820 deg. C.,

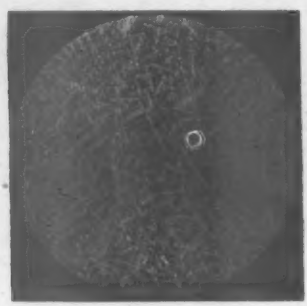

FIG. 16.—DENDRITIC MACROSTRUCTURE IN SPECIMEN IMPERFECTLY SPHEROIDISED. OBLIQUE ILLUMINATION ETCHED PICRIC ACID IN ALCOHOL. × 4.5.

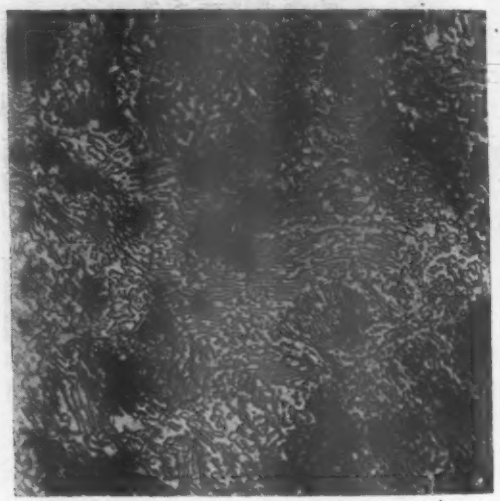

FIG. 17.—DARK AREA MARKED IN FIG. 16. × 600.

TABLE V.—*Typical Analysis :—C*, 1.0; *Si* 1.0; *Mn* 0.4; *and S and P less than* 0.06 per cent.

State.	Yield, tons per sq. in.	Ultimate, tons per sq. in.	Elongation, per cent.	Bend* deg.	Brinell.	Izod, ft.-lbs.
			Less than			Less than
As cast	—	60 to 70	5	—	300 to 320	2
Normalised	—	55 to 60	4 to 6	—	280 to 320	—
Fully spheroidised	31	49	15	60 to 100	220	3 to 6
Partially spheroidised	38	55	8	30	260	—
Spheroidised with excess of temper carbon	26	45	8 to 12	20 to 35	190 to 210	—

* Blend specimen 1 in. by ⅜ in. by 6½ in. centres round ¾-in. diameter former.

a two-hours' soak at 820 deg. C. increasing a mean figure for temper carbon in the casting from 0.06 to 0.13 per cent., whereas a two-hour soak at 860 deg. C. or 890 deg. C. leaves the temper carbon figure substantially unchanged at 0.07 per cent. Lowering the silicon content to 0.9 per cent. reduces the formation of temper carbon in two hours at any of the above temperatures to a negligible amount. The speed of cooling to 600 deg. C. was about 60 deg. C. per min. in all cases.

Owing to the absence of graphitic nuclei the breakdown of cementite to temper carbon at the cast stage is dependent more upon silicon content than upon cooling speed (between the limits of sand cooling, and air cooling from 900 deg C. with castings of 1 to 2 in. section). Typical figures for graphitic carbon with steel 1 per cent. C and 0.9 to 1.0 per cent. Si, in the cast state, are 0.02 to 0.08 per cent. With initial carbon and silicon figures of 1.1 per cent., however, the graphitic carbon in the as cast state may rise to 0.16 per cent. An extreme case of the production of temper carbon is shown in Figs. 19, 20, 21, where clearly defined areas of ferrite, temper carbon, pearlite and spheroidal cementite lie close together.

This specimen, high in both silicon and carbon, is more nearly akin to a low carbon cast iron, and showed exceptionally coarse macrostructure after annealing for 4 hrs. at 910 to 940 deg. C., and spheroidising at 800 deg. C. for 3 hrs. followed by slow cool. The analysis was: Total carbon, 1.29; graphitic carbon, 0.58; silicon, 1.29, and Mn, 0.54, and the mechanical properties were: yield, 26 tons per sq. in.; U.T.S., 51.2 tons per sq. in.; elongation, 7½ per cent.; bend, 28 deg., and Brinell, 223.

The distribution of temper carbon with reference to the macrostructure is of interest. The interdendritic bands which in Figs. 20 and 21 are seen to be almost free from temper carbon, consist of fully spheroidised cementite in a ferrite matrix. At the junction of the bands and the clearly dendritic areas appear the most massive clumps of temper carbon, which Fig. 21 shows to be associated with lamellar cementite and free ferrite. Another specimen from the same bar as that in Figs. 19 to 21, when reheated for 2 hrs. at 930 deg. C. and rapidly cooled, showed a temper carbon content of 0.2 per cent. and the gross structure visible in Fig. 20 had entirely disappeared. Respheroidisation for 3 hrs. at 795 deg. C. followed by very slow cool, however, increased the temper carbon again to 0.39 per cent. and restored the gross macrostructure.

In general, it may be stated that for sand-cooled castings, cooling to black heat in about 1½ hrs., the temper carbon will not exceed 0.08 per cent. After annealing above A_{cm} the amount will be reabsorbed and further reprecipitation is most likely to take place between 810 and 840 deg. C. With carbon below 1.1 per cent. and silicon below 1.0 per cent., soaking for 3 to 5 hrs. up to 810 deg. C. is unlikely to pro-

FIG. 18.—UNDISPERSED CEMENTITE BOUNDARY WITH TEMPER CARBON IN A BACKGROUND OF FERRITE AND SPHEROIDISED CEMENTITE. × 1200.

FIG. 19.—DENDRITIC MACROSTRUCTURE IN 1.29 PER CENT. C. 1.29 PER CENT. SI STEEL AFTER HEAT-TREATMENT. OBLIQUE ILLUMINATION. × 8.

Modification by Heat-treatment

duce more than 0.03 per cent. temper carbon. These temperatures will be modified by variations in carbon and silicon content and the lower temperature limit is greatly affected by the previous history. If temper carbon has once been formed in any quantity and has only been reabsorbed by heating above the A_{cm} for a short time, it will usually reform at temperatures much lower than in its first formation, and if the best physical properties are to be attained, its initial formation should be avoided by rapid cooling through the critical temperature range.

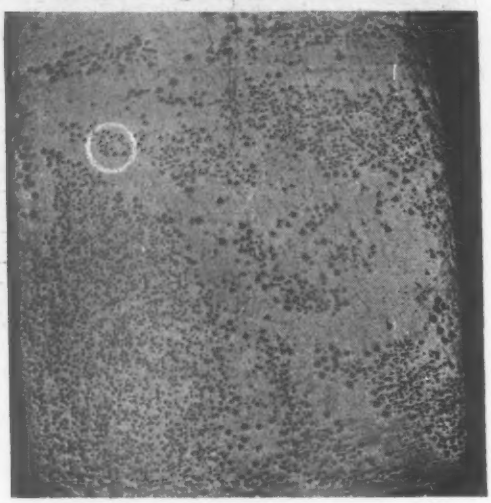

FIG. 20.—SAME AREA AS FIG. 19. VERTICAL ILLUMINATION. × 8.

Mechanical Properties

The steel is characteristically brittle in the cast and normalised state, but develops a surprising degree of ductility and toughness in the spheroidised state with temper carbon up to about 0.2 per cent. Above this figure the strength, ductility and hardness are slightly reduced and the bend considerably reduced. The relatively low Izod value is characteristic of spheroidised structures which are usually very notch sensitive. This combination of ductility to steady stress, with brittleness to sudden stress, is revealed in a very interesting manner in fractures where heat-treatment has produced appreciable quantities of temper carbon.

Fig. 22 shows a fractured bend specimen which shows clearly interdendritic precipitation of temper carbon over sections of the fracture, with narrow intervening bands apparently free from temper carbon. Fig. 23 shows a similar effect on a tensile fracture in which the greater portion of the fractured surface is apparently free from temper carbon, but a small area is covered with interdendritic carbon. Microscopic examination shows that actually there is no segregation of temper carbon at the areas indicated, but that it is uniformly distributed at dendrite boundaries over the entire specimen. That it is only revealed locally is due to the mechanism of fracture.

In the case of the tensile specimen, the first stage of fracture takes place fairly slowly and permits of local elongation which conceals the particles of tem-

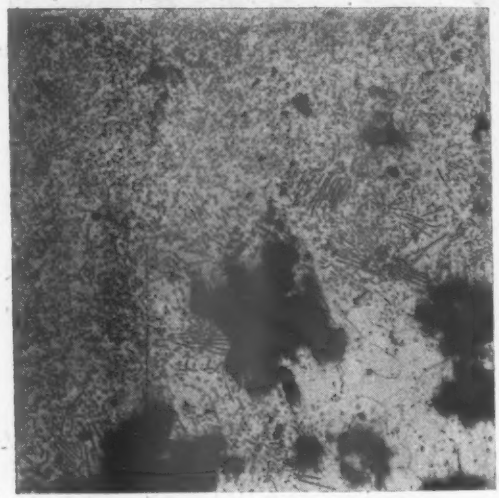

FIG. 21.—SAME AREA AS FIG. 20, SHOWING BAND OF SPHEROIDISED CEMENTITE IN FERRITE BORDERED BY LARGE MASSES OF TEMPER CARBON ASSOCIATED WITH PEARLITE AND FERRITE. × 300.

per carbon—the final stage takes place very rapidly and the fracture is brittle so that no extension of the ferrite takes place in the immediate vicinity of the clumps of temper carbon. In a normal fracture, temper carbon, when present (up to 0.2 per cent.), is with difficulty visible to the naked eye as minute black specks, apparently distributed uniformly, and which are quite distinct from the coarse orderly distribution of interdendritic carbon when present in a "black fracture." In the case of Fig. 22, the bend fracture has taken place in stages of rapid fracture, bend, rapid fracture, bend, etc., giving the appearance of laminar segregation in the final fracture.

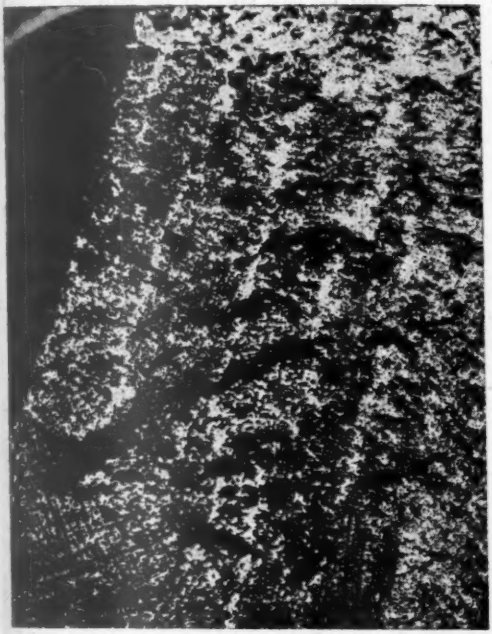

FIG. 22.—FRACTURED BEND SPECIMEN WITH INTERDENDRITIC CARBON AND APPARENT LAMINATIONS. × 8.

Acknowledgment

The Author wishes to thank the directors of the Parkinson Stove Company, Limited, for permission to publish these results, and Mr. W. Todd for his help during the course of the investigations.

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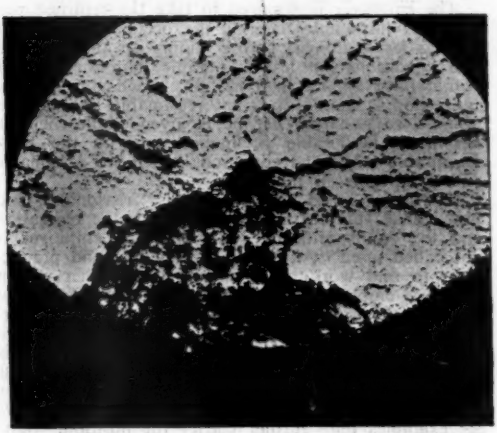


FIG. 23.—TENSILE FRACTURE SHOWING APPARENT LOCALISATION OF TEMPER CARBON. × 8.

AMERICAN FOUNDRYMEN'S ASSOCIATION

NEW TECHNICAL DEVELOPMENT PROGRAMME

Officers of the American Foundrymen's Headquarters Staff were elected for the coming year at the annual meeting of the Association's board of directors, held in Chicago, July 11 to 13. At the same time the directors created a new technical development programme for the purpose of expanding the technical activities of the organisation.

Staff officers elected were as follow:—Secretary, Mr. R. E. Kennedy; director of the technical development programme, Mr. N. F. Hindle, formerly assistant secretary; treasurer, Mr. C. E. Hoyt; assistant treasurer, Miss Jennie Reininga; business manager, Mr. Wm. W. Maloney, formerly assistant secretary.

In broadening the Association's technical scope, the technical development programme will operate in accordance with the fundamental objectives already established. Its functions, in the main, will include:—(*a*) Revision and publication of special books and pamphlets on specific phases of foundry practice; (*b*) collection, review and correlation of published and unpublished data; (*c*) promotion and co-ordination of investigations now being carried on by the Association; (*d*) establishment and development of broader library facilities; (*e*) establishment of broader abstract and bibliographic services, and (*f*) development of material for presentation before the branches and other engineering and technical groups.

As director of the programme, Mr. Hindle will head the new set-up under the general supervision of Mr. Kennedy, working with an advisory committee composed of three members of the board of directors and representatives from management, technical, and operating groups of the various branches of the industry.

RETURNED EX-SERVICE EMPLOYEES

EMPLOYERS' OBLIGATIONS

By F. J. Tebbutt

The Reinstatement in Civil Employment Act, 1944, provides that the last employer is under an obligation to re-engage on return to civil life any person who has seen service in the Navy, Army, Air Force, women's auxiliary services or Civil Defence Force (those conscripted by the 1941 Act) formerly employed by him.

The employer is required to take the returned person into his employment in the occupation in which he was last employed before joining up and on terms and conditions not less favourable than those which would have applied had he not joined up; but the obligation is met if it is not reasonable and practicable to so re-employ, if he is given employment in the most favourable occupation and on the most favourable terms and conditions which are reasonable and practicable in his case.

It will be noted that the words "reasonable and practicable" play a big part as regards the obligation and the Act specifically states that the employer is not called upon (it not being reasonable and practicable) to find work by dismissing some other person who was employed before the returned person joined up, was then of longer service, and whose employment was not less permanent in character than the applicant's employment. On the other hand, it is shown that a person not with the qualifications just mentioned can be dismissed, and this applies whether this person comes under the Act or not. The following examples may further clarify the position. Suppose a person employed after the person joined up is himself called up later; both are under the Act, but the first called up, on discharge, has prior right to reinstatement, and the employer is not bound to re-employ the substitute person if not reasonable and practicable to do so. If the substitute employee is discharged from the Services first and is re-engaged, when the first person called up comes back, he gets the job, but the substitute person is not necessarily dismissed—he also is under the Act—and if it is reasonable and practicable for the employer to find work, he is required to do so, but if there is no suitable job available, the employer is within the law by dismissing him, as it is not reasonable and practicable to employ him.

If reinstatement is desired, application must be made to the employer or through an Employment Exchange (not, of course, if the employer has already intimated he is giving the returned person employment), and the applicant is allowed until the fifth Monday after date of discharge to do so. The employer must be informed when the employee is available for work, and this date must be within four weeks after the end of the application period just mentioned. Thus the person on Service discharge has eight weeks before he need start civil work.

The employer is required to find work at the first opportunity at which it is reasonable and practicable to do so, after the date given by the returned person as when he can restart. The obligation upon the employer, however, can remain indefinitely if the returned person renews his application every thirteen weeks; this is useful for firms under the Concentration of Industries schemes.

On reinstatement the engagement must run for 26 weeks or for so much of this period as is reasonable and practicable; if the former employment had been for 52 weeks (or more), then 52 weeks applies instead of the 26 weeks mentioned.

Reinstatement Committees will function up and down the country to settle disputes between the parties and, if a Committee finds that an employer is at fault, an Order can be made that employment is to be found and/or an Order requiring compensation to be paid for any loss suffered by the returned person, this amount, however, not to be more than the remuneration he would be entitled to receive if the obligation had been carried out.

A CASTING DEFECT DIAL

The Eastern Clay Products, Inc., of Eifort, Ohio, U.S.A., has done a real service to the foundry industry by the issuing of one of those double rotatable cardboard dials, the uppermost part of which is furnished with a window. Along the outer periphery of the larger and lower disc are printed nine major defects to which all castings are more or less prone. By setting an arrow at the defect being exhibited, the window gives the cause set out against some of seven properties, all related to sand and moulding. Moreover, the causes are numbered, and set out below under thirteen headings are the remedies.

We are unaware as to the extent American generosity can be extended—but we personally have found it to be almost unlimited—and we think if readers mentioned the Journal, they would probably receive a dial by writing to Eifort.

FOUNDRY MANAGEMENT

(*Continued from next page*)

ever, be made to secure that knowledge. The effect, even if only partially carried out, amply repaid the trouble involved. The appreciation of the right number of men required to perform any particular operation in a certain time was an important factor. Work was often hampered by having too many men detailed to it; this was worse than having too few, and it had a bad effect on the men.

An executive must always remember that the object of his organisation was the efficiency, health and comfort of the personnel, and the more he could get his subordinates to realise that all his rulings have this end in view, the more he would obtain that wholehearted and intelligent co-operation from them all by which the desired end alone could be achieved.

Thanks of the gathering to Mr. Blakiston for his hospitality were voiced by Mr. H. Forrest and Mr. H. W. Griffiths, and for his address by Mr. Timbrell, Mr. W. G. Thornton and Mr. R. D. Welford.

FOUNDRY MANAGEMENT

MR. J. BLAKISON'S PRESIDENTIAL ADDRESS TO THE WEST YORKSHIRE BRANCH

Opening the new winter session of West Riding of Yorkshire Branch of the Institute of British Foundrymen, at Bradford Technical College on October 14, the President (Mr. J. Blakiston, A.I.Mech.E., of Halifax) entertained a record gathering of over 60 members at tea at the College refectory, where he delivered a brief Presidential Address. Later, in the Great Hall of the College, Mr. Blakiston gave the first ordinary meeting of the session, a *résumé* of his Paper on "Mechanical Aids to Core Production," which, read before the East Midlands Branch earlier in the year (and printed in THE FOUNDRY TRADE JOURNAL of May 18 and 25, 1944), had been awarded a Diploma of the Institute. The Paper was illustrated by lantern slide photographs and diagrams.

Mr. J. Timbrell, of Bradford, senior Vice-President of the branch, presided over the proceedings at both gatherings.

In the course of his Presidential Address, MR. BLAKISTON said that when he first began his engineering career the fact that he should become so closely connected with the foundry was a very remote possibility, and he never realised what a vital section of engineering this foundry industry was, offering more scope and inculcating horse-sense into any apprentice prepared to take advantage of it. His first early contact with the foundry was for a few months as part of a general apprentice's training. During those months he learned two facts—first, that if an incorrect or no facing sand is used the resulting casting had a skin like a rhinoceros and, secondly, that the too lavish application of the water brush will produce a casting with a cellular construction acclaimed in the confectionery trade but decried in the machine shop.

Some years later advancement brought him to a position that carried with it the responsibility of supervising the production of foundries, and it was during this time that his more intimate knowledge of founding technique developed. In this and in a subsequent position held he was fortunate in having two excellent foremen of the old school, who were also extremely broad-minded—not a combination always available—and who were keen to exchange their foundry knowledge for his mechanical knowledge and which resulted in a mutual benefit. It was noted during discussions that the correct mechanisation or planning of a foundry operation was not in itself a guarantee of successful economic production, and that highly mechanised and well-laid-out foundries had been known to close down owing to being unable to meet with competition, while the ill-equipped foundry across the road could maintain full production and show a good profit.

Another point frequently discussed was why a foundry showing a high return one month should for no apparent reason show a corresponding loss the next month, and foundries that had run for years with a high reputation should become insolvent. He might add that at the time of these discussions the country was going through an economic crisis.

Two Factors

Two factors emerged from these discussions. These were the two points he wished to stress in this address: (1) Any foundry can secure profitable continuity of operation provided it is adaptable, and this applies just as much to a highly specialised foundry, which should, if needs be, be prepared to make plant changes to follow public fashion and market demand; and (2) that the relationship between the operatives, the staff and the administration had to be bound together in the closest possible co-operation. It was useless adapting a plant if the operatives were not prepared to adapt themselves to it. The discipline in a well-run foundry had to be strict in all directions, and it was found that a well-disciplined foundry attracts the better type of labour, while a slack foundry attracted the poorer type.

In these days of nationalisation, rationalisation, combines or any other activity showing the same trend, the personal touch between the managers and the operatives was often lost, and as soon as this was so, the foundry ceased to be efficient. This lack of co-operation generally reflected first in the foundry section of a combine. It was, in fact, the barometer of the whole concern. There should always be a key person in these organisations who was available, and to whom operatives would look for guidance, and, when ridiculous anomalies created by the system occurred, would cut through the red tape and rectify a grievance, whether mental, physical or financial, at once.

The greatest and oldest industry on which the stability of this country depends was shipping. Now shipping was nearly always operated by combines or Lines, but, no matter what organisation was adopted, the captain was always master of his ship. It was not the board of management that decided what to do in a storm or in a difficulty, but the captain. With this example in mind, he compared a well-run foundry and referred without apology to Chapter 1 of the second volume of "The Manual of Seamanship"—the seaman's "Bible"—and likened it to the successful manning of one of his Majesty's ships.

Organisation, Knowledge and Experience

The power of organisation varied in individuals, and even if some were gifted with it instinctively, it must be supplemented by a thorough knowledge of the profession and, if possible, by experience, when dealing with the technical and practical control. An operation that was well organised would run smoothly, whereas bad organisation tended to demoralisation, slackness and discomfort. Nothing, especially at the start of a new operation, must be regarded as too trivial to be included in the executive's plan of the routine. In a large concern, with a constantly changing personnel, the knowing of everyone personally presented great difficulties. Efforts should, how-

(*Continued on facing page, column* 2.)

CONTROLLING THE MIXING OF FOUNDRY SANDS*

Modern and progressive foundries realise the advantages and importance of sand control. However, sand control does not mean merely following routine tests and recording figures, but interpreting these results in relation to casting conditions. Also, sand control is following the physical properties which are established and found to give the best results. At the present time, with inexperienced laymen, sand, as delivered to the moulders and core-makers, is not as uniform as it might be. If uniformity of results is not obtained, the foundryman must approach his problem from two angles; first of all, uniformity of raw materials, and, secondly, mixing technique and handling.

Uniformity of raw materials can be easily checked for physical properties in the laboratory. The next step would be a study of his mixing technique. This would include checking the method of adding binders, mixing time and cycle, and adjusting the return sand to maintain uniformity. It is recognised to be far superior to add all materials by weight instead of volume. For example, a foundry bentonite might easily vary 25 per cent. by weight from one addition to the next if measured by volume; that means one batch might contain that much more or less clay—resulting in vastly different physical properties. An inexpensive platform scale will correct this condition and easily pay for itself many times, since the millmen are usually a little on the generous side, other conditions being constant.

However, if measuring additions by volume is the shop practice, the supervision should regularly check to see if the measuring pails or cans still have their intended volume. A three-gallon pail with several dents no longer can hold three gallons. These may be tested with standard measuring cans kept in the laboratory. Well made, hardwood boxes are preferable to metal containers, since they will maintain their intended volume.

Mixing Technique

Every mixer should be equipped with a water meter. With room temperature sand, moisture control should be relatively simple; but, with hot system sand, moisture control is an extremely complicated problem. Moisture additions must be made according to the temperature of the sand; that is, proportionally larger additions for higher temperatures. A quick-reading, dial-type thermometer with a range of 260 deg. C. can be installed on sand batch hoppers and a table worked out to give amount of moisture to be added for the desired percentage at the moulders' station. This table or graph and dial could be mounted beside the water meter. For a still better control, the table could be sub-divided into several columns; one set of figures to be used when the atmosphere is dry, another when average, and a third when humid. This is an important factor when the sand must be conveyed on open belts for long distances.

Some foundries put damp sacking over their facing sands to prevent drying out. Certain chemical additions have also been added to keep sands from losing moisture to the air. In synthetic sand mixes, dry additions are usually added to the sand and mixed dry. A better blending of sand and binder is claimed if a small percentage, for example, 0.5 to 1.25 per cent. water is added to the sand before the binders. The bond is more evenly distributed and little is lost if the mixer is ventilated. In any case, this mixing period should be uniform. This same procedure is preferable when mixing core sands containing dry binders. It is a disputed point in straight sand-oil-water mixtures whether to add the oil or water first. Sands to which the oil has been added first tend to have a higher strength, but are not as uniform as those in which the water has been added first.

The actual mulling time should be closely controlled. A variation will rapidly change green, dry, and hot strengths, also flowability, as well as other properties. The time cycle depends on production demands. Most foundries use a too short mulling time. However, for uniform results, a definite cycle must be established. The mixer operator should have sufficient time at peak production to match this cycle. If the mill man once gets into the routine of working to a timer, it is no more actual work or effort than not. It is possible to over-mull foundry sand.

Shake-Out Practice

Reclaimed system sand should be constant. This is difficult, but possible by having a uniform routine at the shake-out. That is, shaking out large, medium, and small work in a regular order so that the return sand will be a mixture rather than in layers in a storage bin from the different work being shaken out.

If a muller is used for one or two particular sands, a recording wattmeter is a good indicator of sand properties. To be more explicit, a mixer draws so many watts when running empty; when loaded, the wattage increases in proportion to the load—that is, more wattage is required during the dry mixing period. When the tempering water is added, the load again increases as the green compression of the sand increases. This load, measured in watts and correlated to green strength in the laboratory, is a method of checking each and every batch from the mixer. The time cycle of each batch can also be obtained from the chart. The foundryman has only to check this wattage at the highest or discharge point to see if his sand is uniform. It must be remembered that if moisture is necessarily varied to deliver sand uniformly to the moulding station, these wattmeter figures will vary somewhat.

* From the "Foundryman's News Letter," published by the Harry W. Dietert Co., 9330 Roselawn, Detroit 4, Mich.

"Foundry Practice"—the house organ of Foundry Services, Limited, of Long Acre, Nechells, Birmingham, 7—in its September-October issue publishes a good practical article on the "Production of Bronze Liners."

SOME USEFUL WARTIME DEVELOPMENTS IN WHITEHEART MALLEABLE IRON

By G. R. WEBSTER

Discussion on a Paper presented at the annual conference of the Institute of British Foundrymen. The President, Mr. J. W. Gardom, occupied the chair. Mr. Webster's Paper was printed in our issues of October 5, 12 and 19.

MR. A. E. PEACE first congratulated Mr. Webster on the excellent arrangement of his Paper and his very fine illustrations. Suggesting that a little extension of the information given throughout the Paper would have been of value, Mr. Peace said it seemed that some of the details had been omitted. It was worth while pointing out that in the drop test referred to in the Paper the actual blow was 75 ft.-lbs., on a track link which had a maximum section of something like ¼-in. or ⅜-in.

In connection with Table I, showing the effect of various heat-treatments on the physical properties of B.S. test-bars, he pointed out that the total carbon content of the metal which the Author had used, namely, 2.86 per cent., was very low for whiteheart malleable and was not customarily produced in the trade, although some manufacturers did produce it with carbon contents as low as that. But the Author was working hematite-steel mixture and with the use of receivers was able to maintain low carbon contents, which undoubtedly were advantageous in obtaining improved physical properties.

In addition to the extremely low carbon melts used for the tests reported in Table I, the metal was given an anneal of 160 hrs. at 980 deg. C., which was approximately double the normal time to which the Author had referred earlier. It would have been valuable, therefore, if some data had been given of the metal normally produced, which would have a somewhat higher total carbon content and a shorter anneal. The heat-treatment of this metal at, say, 770 to 800 deg. C., and without a tempering process, such as was standard treatment for the track links, would give an elongation of about 1 per cent. It was important to realise that, because when one spoke of 1 per cent. elongation one wondered whether there was an elongation there at all; at any rate, one was certainly referring to a very stiff material. Again, the particular link illustrated in Figs. 18 and 19 was tested in transverse at 8-in. centres, with the load applied in the centre, and it was required to give a minimum deflection of 4 deg. before breaking. That also indicated that the material was very stiff.

Specifying Elongation Percentages

Mr. Peace emphasised that, whilst the material used in the track links was of extremely low ductility, as one considered it in terms of elongation or bend, yet the castings performed a most arduous duty in the Bren gun carriers; in service they were subjected to shock loading and complex stresses. Before the war one would not have thought that material of such low ductility would have stood up to the very severe service conditions. After asking how the yield point was determined, Mr. Peace discussed the measurements of elongation. He was in sympathy with Mr. Webster's views concerning the use of ½ per cent. elongation in a specification; he did not think that was the right thing to do, but he did not agree that one could not record ½ per cent. elongation and could not measure it with sufficient accuracy. The reference to millimetres was a little confusing; but the ½ millimetre which the Author had suggested was a quite likely measurable inaccuracy equalled about 1/50th-in. However, one could readily measure with dividers to 1/100th-in., and some people reckoned to measure to 5 thousandths. Mr. Peace imagined that the difficulty rather was to take an accurate measurement on the test-piece; great care and skill must be exercised in dot-marking and picking up the measurement from the dot-marks.

Stringed Carbon Nodules

Drawing attention to the two adjoining nodules of graphitic carbon at the top of Fig. 29, Mr. Peace asked if the Author had experienced the stringing together of carbon nodules in whiteheart malleable, there being some 6 or 7 nodules adjoining one another with pro-eutectoid graphite filling in the interstices, giving a sausage shaped carbon aggregate. He suggested that the stringing out of the graphite was due to an additional nuclearisation effect, which occurred when certain inclusions were present in the metal. In his own practice he had occasion to use aluminium additions, and he had found that the stringing out of the carbon nodules was very pronounced when aluminium was used; when the aluminium additions were abandoned, the trouble had largely disappeared. The stringing out of the carbon nodules decreased the shock resistance and lowered the ductility quite appreciably. One could actually see them in a fracture, for they were astonishingly large; they appeared to be perhaps $\frac{1}{16}$th-in. long.

Peeling

Since the Paper was written there had been a number of reports on the question of peeling, but they had had a very limited circulation, probably for reasons of security. The Author would be aware that there was one school of thought which did not agree entirely with him. He had referred to peeling occurring slightly more readily when using a strong ore mixture, and the majority of whiteheart malleable makers had associated peeling with strong ore mixtures, but there were some investigators who disagreed with that view. In his own experience Mr Peace had found that, prior to running into serious peeling trouble, the oxidised edge which one could see in the fracture of whiteheart malleable gradually increased, becoming deeper and of a darker grey; he asked if the Author had noticed the same happening prior to the occurrence of peeling.

Yield of Castings

MR. G. R. SHOTTON, after congratulating Mr. Webster on the excellence of the Paper from the

Whiteheart Malleable Iron

descriptive point of view, commented that perhaps the title was a little misleading, because the Paper dealt essentially with developments in the production of track links and not so much with whiteheart malleable as a material. However, that was incidental.

Early in the Paper the yield of castings from the total metal in the box was mentioned, and the Author had given percentages of 47.7, 42.8, 53.9 and 44.6. On the following page the Author had given a typical cupola charge, and it was stated that the back scrap was 68 per cent. Obviously the Author had taken individual boxes of castings and had weighed them, but that did not represent the yield from the metal melted.

Under the heading "Hardening," reference was made to the necessity for thoroughly annealing the castings before carrying out the hardening operation. That was self-evident, but perhaps the Author should amplify that in regard to the particular casting, because one of the most serious troubles experienced in the early days of the production of that link was due to the fact that, although the casting was annealed in the commercial sense, it was not sufficiently decarburised. It was essential to ensure the proper degree of decarburisation, because otherwise there would be a much greater degree of hardening due to the condition of the carbon, and, in particular, the re-solution of graphite carbon. The same remarks applied to the heat-treated material for which results were given in Table I. The annealing cycle was twice that for normal material, and from that point of view the Table might be a little misleading to the casual reader, because those results could not be expected from the normal material.

Whilst agreeing generally with the Author's remarks concerning the value of yield point and elongation results, Mr. Shotton said that perhaps the Author had given an impression which was not intended, for he had stated, after referring to the advantages of elongation and deformation capacity, that "a greater elongation figure means only that a casting which has been stressed over the yield point, that is, which has already undergone plastic deformation, can be distorted to a greater extent before breaking than a casting with a lower elongation value. That seemed to infer that a greater elongation had no value at all. Obviously, however, it was of advantage that a casting should distort appreciably before failure occurred, for that gave a safety margin and a warning that failure might occur.

Why 7½ per cent. Elongation?

Commenting on the remarks of Mr. Peace concerning the ½ per cent. elongation measurement, Mr. Shotton agreed that the measurement of elongation was not necessarily carried to something approaching ½ per cent. But it seemed that the Author was putting the cart before the horse in suggesting that that figure should not be included in a specification nor stated in test results. If the figure were 7.8 per cent. and was declared as 8 per cent., a knowledgeable person would not know whether it was nearer 7½ or 8½ per cent. Possibly the figure of 7½ per cent. in the specification should be regarded as a round figure, in the sense that it was three-quarters of 10. That explained the apparent nonsense of using ½ per cent.

Practice Differences

MR. J. R. ROXBURGH, elaborating the Author's reference to yield of castings from the total metal melted, said Fig. 9 showed that there were three castings in the mould, whereas in his own case it was the practice to put four patterns on a plate. Further, on each of the four castings there was one feeder, whereas Fig. 9 showed that there were three feeders attached to each casting. One could readily understand, therefore, why the yield of castings from the total metal, in Mr. Webster's case, was not a very high figure. The three castings in Fig. 9 weighed about 3 lbs. apiece, a total of 9 lbs. in the box; and there were nine feeders, plus the runners.

Fig. 8 showed another type of link with which he was familiar. Speaking from memory, he said the casting as made in his foundry weighed about 13½ lbs., and the feeder and runners weighed 4½ lbs., making a total of 18 lbs., plus 10 per cent. to cover losses, or 20 lbs. in all. Thus, from 20 lbs. of metal a casting weighing 13½ lbs. was produced, representing a yield of 65 or 67 per cent. Reference was made in the Paper to a typical cupola charge containing 68 per cent. of returned scrap and 21 per cent. of steel scrap. By comparison, Mr. Roxburgh said that he used 15 per cent. of steel scrap, and it was as much as he could do to find 50 per cent. of returned scrap in the mixture.

Apparently there was no reference in the Paper to the straightening of the links after annealing; perhaps as a result of the discussion Mr. Webster would feel that such a reference ought to have been made.

Author's Reply

MR. WEBSTER, after thanking the speakers for their kind references to his Paper, commented first on the yield of castings from the metal in the box. The majority of the castings produced in his foundry normally were of a very small type, and there was a very small output of castings to runners. That was the reason for the large return of back scrap. With regard to the total carbon content, he recalled the statement in the Paper that the total carbon content of the molten metal was controlled within the range 2.9 to 3.1 per cent. Therefore, the figure of 2.86 per cent., to which Mr. Peace had referred, was not very different from the normal production. A bend of from 6 to 8 deg. was achieved on the casting shown in Fig. 18, with a 7 to 8 tons load, without breaking.

With regard to peeling, he preferred to stick to his story that it occurred slightly more readily when a strong ore mixture was used, for he felt that so far nothing had come out which would disprove it. He quite agreed with the last statement of Mr. Peace regarding the darker grey fracture found prior to

(*Continued overleaf, column* 2.)

IRONFOUNDRY FUEL NEWS—XXVII

Ironfounders will, of course, be aware of the existence and activities of the Regional Panels of the Ironfounding Industry Fuel Committee, which were formed in 1943 to assist the Committee to achieve the maximum fuel economy in the industry without any sacrifice of production or efficiency. The principal work of the Regional Panels, the members of which work on an entirely voluntary basis, has been to carry out programmes of visits to individual foundries in their areas to advise on possible ways of saving fuel. Much good work has been done in this direction, and it is worthy of note that two Panels have now completed more than 100 visits each.

Up to the middle of October the total for the West Midlands Panel, operating under the chairmanship of Mr. T. H. Gameson, was 106 visits, while that for the Lancashire Panel (chairman, Mr. E. J. L. Howard) was 101 visits. Close "runners-up" were the London, Southern and South-Eastern Panel (Mr. R. B. Templeton) and the East Midlands Panel (Dr. H. O'Neill). Three other Panels—South Wales, South-Western and East Anglian—while covering fewer firms than those previously mentioned, have been successful in visiting those firms which are responsible for 90 per cent. or more of the whole output of iron castings in their respective areas.

It is difficult to assess the actual total economies which have resulted from the work of the Panels, but Mr. Howard reports from the Lancashire Panel that, taking at random 23 firms which have been visited on behalf of the Panel, if the recommendations which have been made are carried out, a saving in coke of 1,000 tons per annum should result.

USE OF LEADED GUNMETAL FOR THE PRODUCTION OF CASTINGS TO WITHSTAND PRESSURE

Mr. Frank Hudson has drawn the following conclusions from a Paper on the above subject which he presented to the autumn meeting of the Institute of Metals.

As a result of the evidence gained from co-operative tests it can be concluded that:—

(1) Gunmetal containing tin 7, zinc 5, lead 5 per cent., balance copper, appears to be more adaptable for the production of pressure-tight castings of variable section than other lead-free or low-lead-content alloys, such as 86:12:2, 88:10:2, or 86:7:5:2.

(2) Tests to destruction indicate that castings made in leaded gunmetal of the 83:7:5:5 type have a bursting strength at least equal to that obtained from the alternative alloys mentioned above, and this strength is considerably increased by the addition of around 3 per cent. nickel.

(3) Leaded gunmetal has better bearing properties and wearing resistance for the majority of hydraulic applications, in the absence of lubrication, than Admiralty gunmetal of the 88:10:2 type.

SOME USEFUL WARTIME DEVELOPMENTS IN WHITEHEART MALLEABLE IRON

(Continued from previous page.)

"peeling" troubles. Where reference was made in the Paper to a long period of annealing, it meant, obviously, that the metal was properly decarburised.

Thanking Mr. Roxburgh for having raised the important matter of the straightening of the links after annealing, he said it would be appreciated that the castings, after the annealing operation, were distorted, sometimes rather badly distorted, due to the heat and the pressure of the castings in the annealing boxes. But that difficulty could be overcome generally by packing the castings correctly. Invariably the castings would bend; the worst condition was that of a bend and a twist, but in the majority of cases there was nothing more than just a straight bend. That was corrected in the cold condition by a direct blow in a 7-ton air press, the casting being placed in a simple die. Finally, in connection with the reamering, Mr. Webster said that the cored hole was $\frac{29}{64}$ in. (11.5 mm.), the pin was 0.437 in. with a tolerance of plus 0 in. and minus 0.005 in., and the hole was drilled out with a $\frac{31}{64}$-in (11.9) mm. drill. There was a margin for drilling up to $\frac{33}{64}$ in. (12.3 mm.). Approximately from $\frac{1}{64}$ to $\frac{1}{2}$ mm. cut was taken out of the casting.

BLACKOUT IN FOUNDRIES

A conference of members of the Ironfounding Industry Fuel Committee and representatives of Regional Panels of the Committee held at Edinburgh under the chairmanship of Mr. J. G. Pearce, unanimously passed the following resolution:—

"That this conference views with grave concern the effect of continued blackout in foundries, and urges that the regulations concerned should be relaxed as far as possible, without prejudice to the successful prosecution of the war. The conference considers that the continuation of the present conditions will, on account of the special working conditions in foundries, adversely affect the morale of those engaged in an industry which has so loyally played its part in the nation's production of essential war materials. Furthermore, in view of the seriousness of the fuel supply position, the substantial economies which would follow from such a relaxation demand its sympathetic and urgent consideration."

The "Nickel Bulletin" for August/September contains abstracts dealing with American specifications for copper base alloys, production of electrolytic manganese, modifications in the composition of N.E. steels, specifications for nickel-chromium-iron castings for electric furnaces and dynamic hardness testing. Copies may be obtained, free of charge, from the Mond Nickel Company, Limited, Grosvenor House, Park Lane, London, W.1.

DEATH OF DR. T. SWINDEN

VICE-PRESIDENT OF THE I.B.F.

Dr. Thomas Swinden, the senior vice-president of the Institute of British Foundrymen, died last Friday whilst at work at Samuel Fox & Company, Limited, Stocksbridge. He was director of research to the United Steel Companies, Limited, and had created for them one of the foremost industrial research laboratories in the country. He entered Sheffield University with a scholarship from the Central Secondary School. Here he won every possible honour available to him, the Mappin Medal and the City and Guilds Bronze Medal. After graduating—he was amongst the first to receive a degree in metallurgy—he carried out research work at the University of Upsala and quickly established an international reputation as an authority on the influence of molybdenum on steel. About 1908, when in close association with the late Dr. Percy Longmuir, he turned his attention to foundry practice, and was honorary secretary of the recently formed branch of the Institute of British Foundrymen. This interest he never lost, and in due course he became president of the Sheffield Branch, and at the last annual meeting was elected vice-president. In 1913, he was made a doctor of metallurgy, and the following year received the Carnegie Gold Medal. By 1935, he was serving on the Council of the Iron and Steel Institute and was chairman of numerous committees and sub-committees.

One of Dr. Swinden's especial interests was the question of ingot mould life, and once more his interest in foundry practice was revived and, in conjunction with Mr. G. R. Bolsover, contributed to a small symposium on the subject held at the I.B.F. Conference in 1935. In 1941, he received the highest award open to a metallurgist—that of the Bessemer Medal. His great achievements never altered his innate modesty. He was kindness itself to the student and there are many who owe much of their success in life to his help. He was rightly intolerant of the charlatan, and his slightly cockatoo wisp of hair seemed to bristle whilst he humorously unmasked their wiles.

The passing of "Doctor Tommy," as he was affectionately known throughout the industry, leaves a void that will be almost impossible to fill, for his mind was the best balanced metallurgical brain in the country. The age of 59 is too early for the full stature of a scientist to be reached, and if he had but been granted a period of peace in which to complete many of the schemes he had in hand, his contributions to metallurgical progress would indeed have been profound.

ACCORDING TO the U.S. War Production Board, the estimated supply of steel available to the steel products industry for the fourth quarter of 1944 totals 16,085,000 tons, as against the estimated supply of 15,900,000 tons for the third quarter. The 185,000-ton increase has been attributed to new plant which, however, has not yet begun operating at full capacity because of shortages of man-power.

BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION

MR. G. L. BAILEY'S APPOINTMENT

The British Non-Ferrous Metals Research Association has appointed Mr. G. L. Bailey as Director to succeed Dr. H. Moore, who retired from this post on Tuesday.

Mr. Bailey graduated in metallurgy at Birmingham University, where he was awarded the degree of M.Sc. in 1922 after completing two years' research work. From 1922 to 1930 he was on the staff of the Woolwich Research Department, where he carried out research on a variety of problems in non-ferrous metallurgy. During this period his most notable work was on the casting of 70/30 brass ingots for subsequent rolling, the results of which were published by the Research Association in a monograph "The Casting of Brass Ingots," under the joint authorship of Dr. R. Genders and Mr. Bailey.

In 1930 Mr. Bailey resigned from the Woolwich Research Department to accept the appointment of Development Officer of the British Non-Ferrous Metals Research Association. In this post he was responsible for fostering the application of the results of the Association's researches in industry. He played, however, a wider part in the Association's organisation, and in January, 1942, became Deputy Director.

Mr. Bailey is a Vice-President of the Institute of Metals and chairman of the London Local Section of that Institute. He is a member of the Institute of British Foundrymen and is active in their non-ferrous activities.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"KUTERN"—Non-ferrous metals. I.C.I. METALS, LIMITED, Wexham Road, Slough.

"SKY-LINE"—Metal goods. PLATERS & STAMPERS, LIMITED, Colne Road, Burnley, Lancs.

"OCTOPLUG"—Wall plugs of common metal. John Duncan, 62, London Road, Cheltenham.

EAGLE (DEVICE)—Textile machinery. DIXON HAWKESWORTH, LIMITED, Hanson Street, Middleton, Lancs.

"SANDAL"—Metal fittings. THOMAS SANDERS, LIMITED, 13, St. Mary Street, Ladywood, Birmingham, 16.

"MORGANITE"—Machinery parts. MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11.

"MORUNDUM"—Ceramic articles. MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11.

"ALUMILITE"—Pistons for internal combustion engines. ALUMILITE & ALZAK, LIMITED, 40, Brook Street, London, W.1.

"WYANCOL"—Machine tools. L. W. YOUNG & COMPANY, LIMITED, 10A, Brompton Avenue, Crosby Liverpool, 23.

THE MODERN PIG

IF YOU WANT...
clean iron, free from sand, free from sows ...uniform analysis... convenient size...easy handling... specify
STANTON MACHINE CAST PIG IRON

SPECIFICATION

WEIGHT	80-90 lbs.
Length	22 inches
Width	8½ inches
Thickness	3¾ inches

(at notch 2½ inches).

Made in our well-known

STANTON, HOLWELL & RIXONS BRANDS

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

NEWS IN BRIEF

"SURFACE FINISH MEASUREMENT" is the title of a Paper to be presented by Mr. C. Timms, M.Eng., A.M.I.Mech.E., at a meeting of the Manchester Association of Engineers at the Engineers' Club, Albert Square, Manchester, at 6.30 p.m. on November 10.

HULME HALL, Allostock, near Knutsford, Cheshire, has been bought for £14,000 by I.C.I. (Alkali), Limited. The estate was founded by Robert Grosvenor, an ancestor of the Duke of Westminster, between 400 and 500 years ago.

THE EARL OF DUDLEY, chairman of Horseley Bridge & Thomas Piggott, Limited, in a statement accompanying the annual report, states that the sales turnover was a record in the history of the company, and the works were fully employed to the extent of the labour available.

A PAPER ON "What the Engineer Expects from the Foundry" will be read by Mr. W. P. Eastwood at a meeting of the West Riding of Yorkshire Branch of the Institute of British Foundrymen, to be held on November 11 at the Technical College, Bradford, at 6.30 p.m.

OXFORD UNIVERSITY have accepted the offer of Mr. Samuel Courtauld of £2,000 a year for seven years for research by Nuffield College into the relative efficiency of small- and large-scale business and allied problems of industrial structure and organisation and kindred subjects.

THE MIDLAND COUNCIL of the National Union of Manufacturers have passed a resolution urging the Chancellor of the Exchequer to give British firms the option of adopting the method of straight-line calculation of depreciation and obsolescence of machinery, as is done in the U.S.A.

TWO FILMS, "Wartime Calls on Women to Make Aluminium Air-cooled Cylinder Heads" and "Pig-iron Production," will be shown at a meeting of the Bristol and West of England Branch of the Institute of British Foundrymen, to be held at the Grand Hotel, Broad Street, Bristol, at 3 p.m., on November 11.

INFORMATION received from the United States indicates that attention is already being given to developing post-war business with the Latin-American republics where it is proposed to give aid towards more intensive industrialisation, thus providing outlets for United States capital goods, and employment for American workers.

A MEETING AT Swansea of the South Wales Siemens Steel Joint Conciliation Board failed to reach agreement in respect of a claim by the employees for a review of the agreement governing payments made as compensation for reduced outputs at steelworks due to war conditions. A claim for an increase in the tonnage rates of third hands at furnaces was met by the employers agreeing to an increase of one penny per ton. A request was made by the unions for consideration of the removal of black-out restrictions at the works, and it was agreed that joint representations should be made to the authorities.

UNITED STEEL ACCOUNTS

The report and balance sheet of the United Steel Companies, Limited, for the year ended June 30 last, shows a balance of profit for the year, after making provision for depreciation and E.P.T., of £2,288,675, the comparable figures for 1942-43 and 1941-42 being £2,026,579 and £1,916,132 respectively. The dividend for the year, as already announced, is maintained at 8 per cent. The directors are again transferring £125,000 to central reserve for obsolescence, but this year £150,000 in addition goes to general reserve, against nil for 1942-43. Reserve for income-tax takes £1,360,000, as against £1,290,000; contributions to staff and workmen's pension and life assurance schemes amount to £180,000 (£152,000); and reserve for debenture stock redemption receives £53,073 (£51,073). The 8 per cent. dividend accounts for £400,960, and £519,304 is carried forward, against £499,662 brought in.

WELLMAN-MESTA COLLABORATION

British steelmakers have for some time felt the need for close collaboration with American engineers familiar with the latest practice in the design and manufacture of rolling-mill and similar machinery.

In the circumstances, the Wellman Smith Owen Engineering Corporation, Limited, have re-established their pre-war connections with the Mesta Machine Company, of Homestead, Pa., and have now made arrangements for exclusive rights for the sale and installation of Mesta rolling mills, rolling-mill appliances, hydraulic presses, etc., in the United Kingdom.

It is hoped by this arrangement that under post-war conditions a free interchange of information and personnel will give every facility for placing at the disposal of British industry the extensive engineering resources of these two companies for the design and manufacture of steelworks' equipment of all kinds.

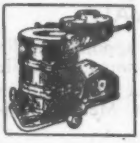
OBITUARY

MR. WILLIAM FERGUSON, a director of the Condor Ironworks, Limited, Oldham, died recently, aged 67.

MR. CHARLES MILLER, a partner in the firm of Hunter, Doig & Palmer, Ward Road Brassworks, Dundee, died in hospital recently. He was 72, and became ill suddenly. He had been associated with the firm for over 50 years.

MR. A. HALL WILSON, chairman of Hall, Russell & Company, Limited, Aberdeen Ironworks, York Place, Aberdeen, and a director of the Burntisland Shipbuilding Company, Limited, and other companies, has died suddenly at the age of 67.

THE U.S. GOVERNMENT has removed all controls from magnesium, which can henceforth be used in any quantity for any civilian product. The War Production Board has simultaneously removed all restrictions on the placing of orders for materials and machine tools for civilian manufacture on the deferred delivery basis.



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CHESTERFIELD
DEEPFIELDS
MIDDLESBROUGH

COMPANY RESULTS

(Figures for previous year in brackets)

Alexander Duckham—Interim dividend of 7½%, less tax (5%).

Manganese Bronze & Brass—Interim dividend of 7½% (same).

Light Production—Profit for the year to April 30, 1944, £67,901 (£59,197); provision for tax, £45,000 (£40,000); depreciation, £7,000 (£3,000); ordinary dividend of 30% (same); to general reserve, £8,000 (£4,000); forward, £4,573 (£3,797).

Tinsley Rolling Mills—Trading profit to June 30 last, £13,997 (£16,969); taxation, £5,660 (£5,500); net profit, £5,449 (£7,478); ordinary dividend of 12½% (same); depreciation, £1,000 (same); reserve, £1,000 (same); forward, £7,520 (£7,421).

T. M. Birkett—Net profit for the year to July 31, 1944, after directors' fees, A.R.P. expenditure, provision for income-tax and E.P.T., depreciation, £7,116 (£9,445); final dividend of 10%, less tax, making 15%, £4,250 (same); to reserve, £750 (£6,250); forward, £3,996 (£4,005).

Modern Machine Tools—Trading profit for the year ended December 31, 1943, £32,880; provision for exceptional depreciation, £5,000; provision for N.D.C. and income-tax, £10,355; interim dividend of 7½%, less tax, £4,500; final dividend of 7½%, less tax, £4,500; forward, £63,571.

Kitchen & Wade—Trading profit to March 31, £136,658 (£118,610); gross dividend from subsidiary, £6,000; provisional price repayments, income-tax and E.P.T., £119,119 (£108,622); ordinary dividend of 25% (25%, plus 5% bonus); to general reserve, £5,000 (same); forward, £4,889 (£5,099).

Blakey's Boot Protectors—Profit for the year to June 30, 1944, after depreciation, E.P.T., etc., £40,424 (£39,449); to income-tax, £23,723 (£23,431); preference dividend, £292 (same); interim dividend of 7½% on ordinary shares, £4,518 (same); final ordinary dividend of 10% (7½%); forward, £51,002 (£45,136).

Richard Johnson, Clapham & Morris—Trading profit for the year ended June 30, 1944, after providing for depreciation, £42,163 (£32,253); directors' fees and staff bonus, £4,500; taxation, £26,000 (£18,000); ordinary dividend of 15% (same); to general reserve, £5,000 (same); forward, after preference dividend, £6,895 (£6,088).

Horseley Bridge & Thomas Piggott—Net profit for the year to June 30, 1944, £38,740 (£39,909); fees, expenses, etc., £5,514 (£5,717); depreciation, £21,000 (same); taxation, £103,660 (£73,479); ordinary dividend of 15% (same); to reserve for contingencies and deferred repairs, £15,000 (£10,000); forward, £65,259 (£64,113).

Zinc Corporation—Balance from mine trading account for 1943, £325,801 (£318,429); interest, dividends, etc., £51,220 (£50,613); balance of appropriation for development, 1942, £1,309; taxation, £228,930 (£211,605); depreciation, £31,521 (£30,523); appropriation for shaft-sinking, £8,000 (£20,000); net profit, £103,716 (£104,590); dividends on the participating preference and ordinary shares of 10% and 20% respectively (same); forward, £58,932 (£58,051).

PERSONAL

MR. J. F. MELLING has been appointed a director of the Projectile & Engineering Company, Limited.

MR. B. G. CHURCHER has been appointed manager of the research department of Metropolitan-Vickers Electrical Company, Limited.

MR. THOMAS HOUGH has been appointed vice-chairman and MESSRS. ROBERT BURTON PAGE and FRED HOWARTH have been appointed directors of Bennis Combustion, Limited.

MR. G. A. LEITCH has resigned from the board of Cannon Iron Foundries, Limited, owing to pressure of other business which necessitates his absence abroad. He has been chairman of the company since November, 1936.

MR. CECIL BENTHAM has been released at his own request from his executive responsibilities as Deputy Controller-General of Machine Tools, Ministry of Supply, but his experience will continue to be available in the position of honorary adviser to the head of the department.

MR. F. S. MITMAN, C.B.E., has joined the board of the Brush Electrical Engineering Company, Limited. For a number of years he was associated with the light alloy industry. In 1939 Mr. Mitman was appointed Director of Light Alloys and Magnesium (Sheet and Strip) Control, Ministry of Aircraft Production, and in 1940 he became Co-ordinator of Aircraft Supplies for Fighter and Naval Aircraft, Ministry of Aircraft Production. He was later appointed by the Ministry Adviser on Light Metals Fabrication. Since 1942 Mr. Mitman has been chairman and managing director of Messier Aircraft Equipment, Limited, with which company he is retaining his connection.

Wills

BATHER, N. F., managing director of Chamberlin & Hill, Limited, ironfounders	£69,883
FENN, CHARLES, of Weston-super-Mare, formerly of S.G.B. (Dudley), Limited	£147,592
NEWMAN, G. W., of Harborne, a director of Newman Bros. (Birmingham), Limited	£1,603
HARRISON, S. C., a director of Harrison (Birmingham), Limited, metal rollers and extruders ...	£656,774
PEARSON, MAJOR T. R., of Brailsford, Derby, a director of the Beeston Boiler Company, Limited	£270,404

PETSAMO NICKEL MINES

Following discussions between the Governments of the United Kingdom, Canada, and the U.S.S.R. on the question of compensation for the nickel mines in the district of Petsamo ceded to the Soviet Union under the recent armistice with Finland, a protocol has been concluded. The agreement states that consequent upon the transfer to the ownership of the Soviet Government of nickel mines operated for the benefit of Mond Nickel Company and the International Nickel Company of Canada, the Soviet Government will pay to the Canadian Government during the course of six years the sum of 20,000,000 United States dollars as full and final compensation.

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Raw Material Markets

IRON AND STEEL

The Control continues to preserve approximate equilibrium between production and consumption of pig-iron. Blast furnaces have reasonable stocks in hand whence they can meet emergency calls, but at this juncture, when fuel economy is imperative, over-production must be carefully avoided. During the past week, there has been a little more interest in the foundry-iron trade, but the weight of orders is still well below normal. Low-phosphorus grades are moving steadily into consumption and the very limited intake of foreign ores restricts the output of hematite to the irreducible minimum.

The scrap position is quiet. Heavy steel suitable for foundry work and refined pig-iron production and good machinery metal in cupola sizes are the grades in strongest demand. Generally, the available supplies of scrap are in excess of the intake. Only limited tonnages of cast iron are being taken up. Wrought-iron and steel scrap is only moving into consumption in diminished quantities. Light material of all descriptions is abundant.

During the summer, users of foundry coke have been able to secure all the supplies that they required and many foundries have been able to build up stocks. At the same time, there are many consumers with no facilities for stocking, who will depend on hand-to-mouth supplies during the winter.

Although in recent weeks there has been some slight improvement in the call from the heavy industries for best bars, additional orders would be welcomed by most makers of finished iron. Makers of No. 3 and No. 4 bars are the most comfortably placed. Demand for crown bars has declined recently. Raw materials for the ironworks are plentiful.

A high state of activity is maintained at the re-rolling mills. This section is at the moment the brightest in the British steel industry. Since imports from across the Atlantic have been reduced to a very low level, and the Control are unwilling to draw on their reserves, the provision of material presents a problem. There is a strong and sustained demand for both prime and defective billets, blooms, etc. Supplies of sheet bars are coming through fairly satisfactorily.

There has been no improvement in the position regarding heavy steel joists, tees and angles. The plate mills could now do with much heavier bookings; for the past four years, however, they have had intense activity. Thin gauges of sheets are in good demand, and large quantities of cold-rolled strip are required. Good deliveries can now be secured of bright-drawn steel in rounds, squares and hexagon sizes. There is strong pressure for colliery material. Galvanising has now been resumed on a fair scale. The market for tinplates is quiet.

NON-FERROUS METALS

With the continued decline in the rate of munitions production, the way should soon be clear for the release of larger tonnages of metal for the more essential civilian requirements. A start has already been made, although so far the quantities involved have only been small. The policy of the Control would seem to be the gradual lifting of restrictions—commodity by commodity—rather than any sudden break, and this will probably apply to the plans for de-control after the war.

In America it is fairly definite that wartime controls will be relaxed as soon as possible after the defeat of Germany. A statement to this effect has been made by Mr. Kluge, president of the U.S. War Production Board. It is quite probable that in some directions a start has already been made in the manufacture of goods for the post-war market. In this country an encouraging statement has been made on these lines by Mr. Dalton, the President of the Board of Trade. He said that the Government will continue, after the defeat of Germany, only those wartime controls which are necessary in the national interest, including, in particular, those needed to bring a speedy defeat of Japan.

It is obvious that in the case of some materials, tin for example, it will be a long time before free trading can be resumed. On the other hand, supplies of some metals, such as copper and zinc, are abundant, and it is probable that only the shortage of labour stands in the way of more liberal allocations. Tin, however, will remain a scarce commodity long after the end of the war in the Far East.

The supply position regarding light metals is satisfactory. Consumption of aluminium is now lower than it was at the highest period of war production, but a substantial tonnage is still taken by the aircraft industry. Imports to Great Britain from Canada are continuing to be made on a large scale. In the United States at the end of August it was found expedient to curtail the production of aluminium, and imports from Canada have been cut down.

It now seems probable that there will be a gradual relaxation of the regulations controlling the use of zinc. This process will almost certainly be slow, but already more concessions have been made in regard to zinc than in the case of the other metals. The supply position is certainly very comfortable, and there is no likelihood of any increase in the use of zinc in munitions production.

AN EXHIBITION now being held at the Bristol Aeroplane Company's showroom at 69, Piccadilly, London, W.1, includes the casting of light alloys into process moulds and numerous examples of castings made by the process are on show. Members of the London Branch of the Institute of British Foundrymen are specially invited to the exhibition, which will continue until November 4.